Madison County, Kentucky

Madison County is part of the Lexington, Kentucky Metropolitan Statistical Area (MSA). It is located southwest of Clark County, west of Estill County, northwest of Jackson County, north of Rockcastle County, northeast of Garrard County, east of Jessamine County, and southeast of Fayette County.

EPA's June 29, 2004 proposal on appropriate designations for Kentucky included Madison County as nonattainment based on the following criteria:

- EPA indicates that Madison County has significant emissions (although this statement is not based on a single pollutant equaling 10,000 tpy or more) and that the county is part of the MSA where at least one monitor is showing a violating MSA monitor.
- EPA states that Madison County has relatively high population density and that Madison County's population growth is significant enough to contribute to PM2.5 violations in Fayette County.
- EPA contradictorily states both that Madison County has relatively high VMT (page 19) and has the largest number of workers commuting into Fayette County (page 22), and that no counties show commuting data with potential to impact Fayette County (page 22), and that only Madison County has VMT and commuting data with a potential to contribute to violations in Fayette County (page 23).

Emissions Data

In Kentucky's original February recommendations, 1999 NEI data was used in the original analysis.

However, in EPA's June 29, 2004, letters to states, EPA looked outside the original MSA boundaries to determine if large emissions contributions from adjacent areas were having an impact on PM2.5 levels within the MSA. EPA also used the 2001 NEI which provided slightly newer data than had been recommended that states use.

Madison County emits only 2% of SOx emissions from the counties recommended by EPA as having the potential to impact the violating monitors. A similar comparison can be made with both NOx and PM. Madison County's NOx emissions rank at 12% of the total EPA recommended areas, and PM at 10%. In a detailed review of EPA's recommended areas to be designated nonattainment, Madison County ranks consistently less than or equal to 12% of combined emissions contributions within EPA's June 29, 2004, proposed nonattainment boundaries. See Figures 1-4 below.

Figure 1

Fayette Area 2001 SOx Emissions

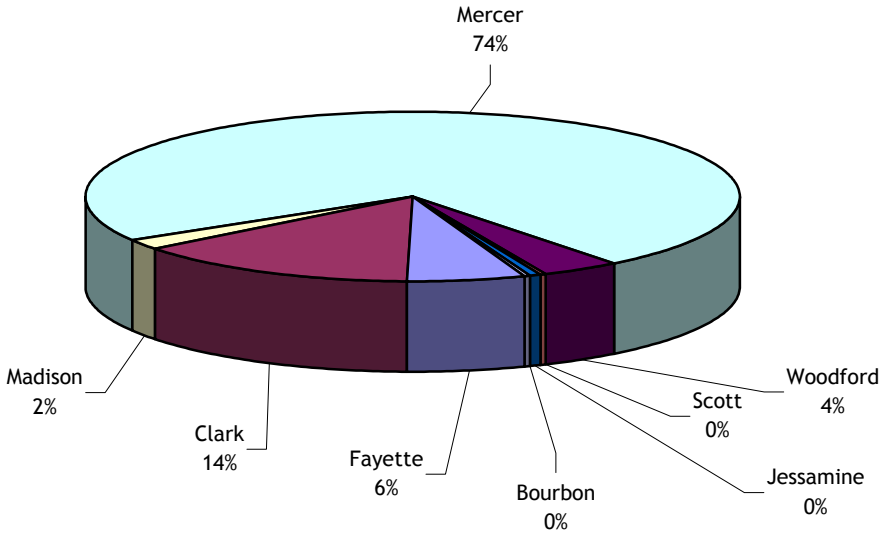


Figure 2

Fayette Area 2001 NOX Emissions

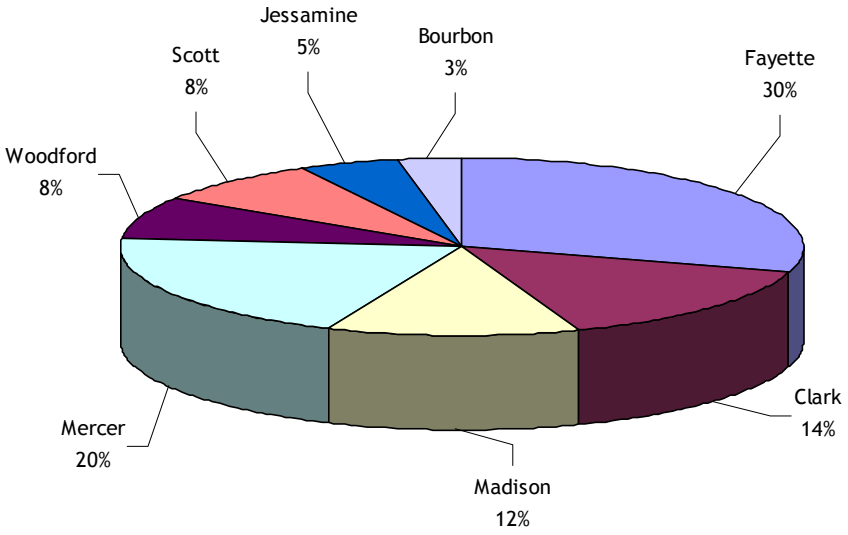


Figure 3

Fayette Area 2001 PM Emissions

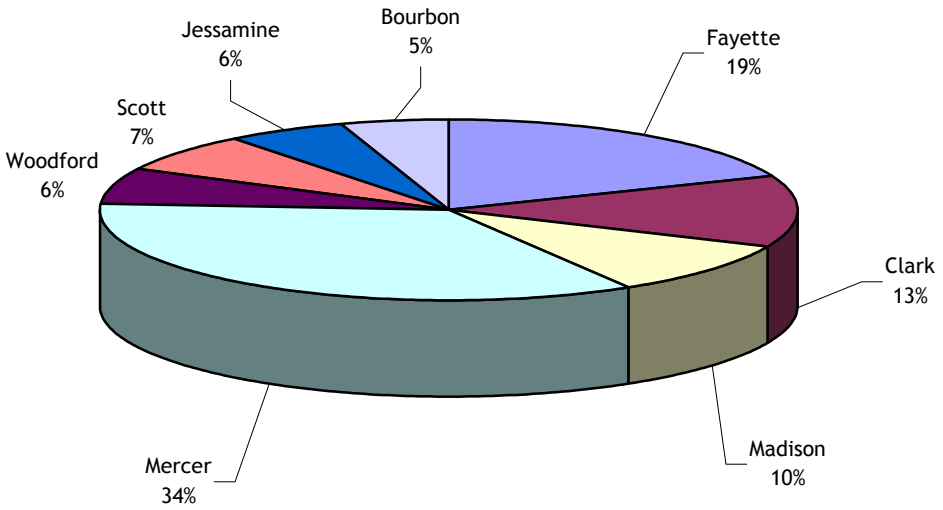
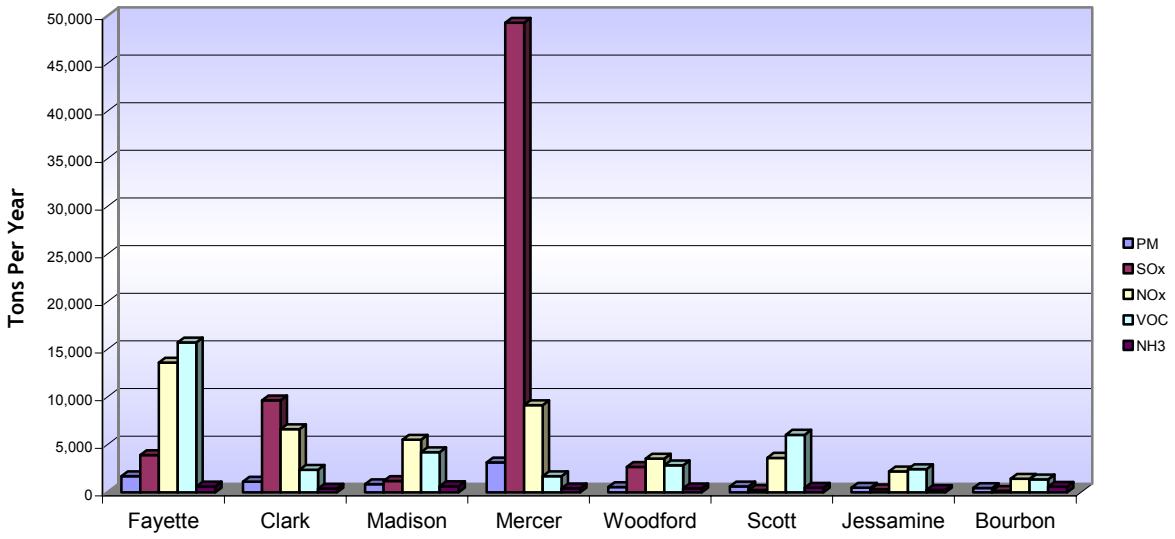


Figure 4

Lexington Area Counties Emissions 2001

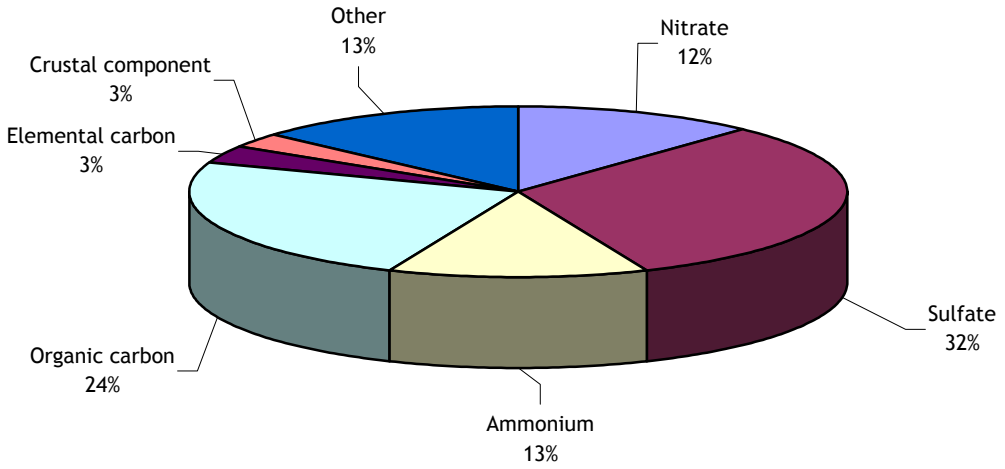


Monitoring Data and Trends

As can been seen in Figure 5 below, the speciation data from Kentucky's Lexington speciation monitor indicates that Sulfate is the major component of the $PM_{2.5}$ values in the area. As can be seen in Figure 1 above, Madison County, Kentucky, contributes only 2% of the SO_x in the counties recommended by EPA as having the potential to impact the violating monitor.

Figure 5

Lexington Speciation Monitoring Data 2001-2003
Average Concentration (µg/m³)



The MSA has three monitors located within its boundaries, two in Fayette County and one in Madison County. In Fayette County, one monitor is located in a central urban area in the midst of the downtown, University of Kentucky campus (Limestone), and the other located on an arterial roadway approximately 1.9 miles north of downtown (Newtown Pike). $PM_{2.5}$ monitoring levels have continued to decline at all three monitors within this region. (See Figure 6 below)

The monitor located in Madison County shows attainment with the PM2.5 standard. For the 2001-2003 timeframe, the design value (13.4 $\mu g/m^3$) is well below the annual standard demonstrating attainment. In fact, this monitor hs the second lowest design value of the 19 monitors in the state.

The Newtown Pike monitor shows attainment with the standard, having an average of 14.9 $\mu g/m^3$ over the time period 2001-2003, and having an average of 13.6 $\mu g/m^3$ through April 2004.

The latest average through April 2004 for the Limestone monitor is 14.7 $\mu g/m^3$. The current design value of 15.6 $\mu g/m^3$ is based on the 2001-2003 time period.

$PM_{2.5}$ levels at each monitor in the region have steadily declined as evidenced by a 15% reduction at the Newtown Pike monitor, a 12% reduction at the Limestone monitor, and a 13% reduction at the Madison County monitor (See Figure 6 below).

Figure 5

Fayette Area PM2.5 Trend Utilizing Most Current Available Data

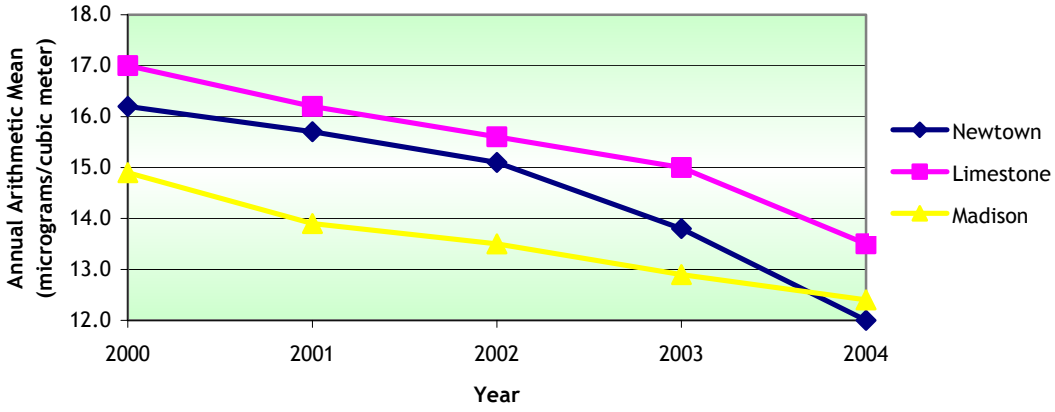
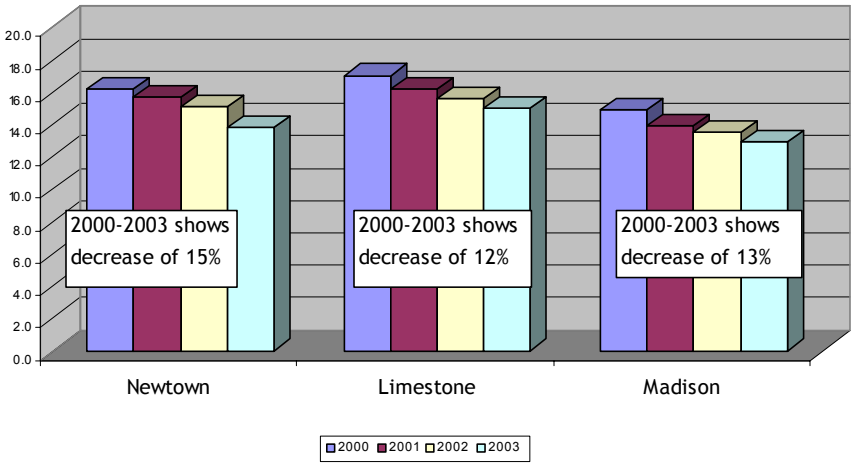


Figure 6

Decline in PM Values for the Fayette Area



Localized vs Regional Impacts

It is Kentucky's position that the monitor located on the UK Campus exhibits an "Urban Core Phenomenon." That is, the monitor's location is at the center of a large public university situated in a downtown metropolitan area with significant activity having a direct relationship to the $PM_{2.5}$ levels being monitored.

This monitor is bracketed by numerous large and small boilers on the University of Kentucky campus and is located adjacent to continuing construction on the campus. Significant local impacts are occurring due to not only the close proximity of the boilers, but also from the emission contributions of construction equipment in the area. This monitor is located only 1.9 miles from the monitor showing attainment of the standard on Newtown Pike.

If significant regional impacts from emissions from Madison County were occurring, they would be expected throughout the regional monitoring network and not at one specific monitor in downtown Lexington.

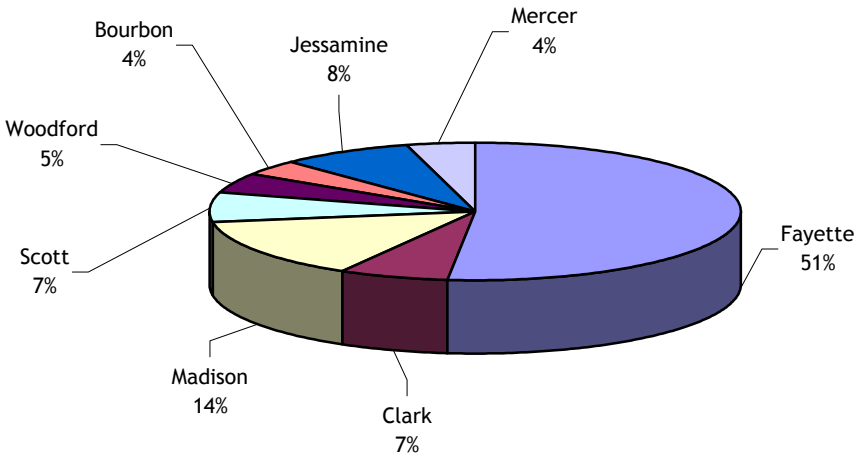
Notwithstanding this Urban Core Phenomenon at the Fayette County violating monitor, Kentucky believes Madison County is attaining the PM2.5 standard and that the continuing downward trend in PM2.5 levels indicate no potential to impact Fayette County.

Population Density and Growth

EPA stated that 2002 population levels indicated Madison County had the potential to impact PM2.5 violations in the area. However, while Madison County has the second highest population level of the MSA counties and surrounding counties with significant weighted emissions scores, the county itself comprises approximately 15% of the entire MSA, and only 14% of all the counties recommended by EPA as having the potential to impact the violating monitors. See Figure 7 below.

Figure 7

Lexington Area 2002 Population for USEPA proposed $PM_{2.5}$ Nonattainment Counties



Traffic and Commuting Patterns

EPA's position on traffic and commuting patterns in the June 29th letter was contradictory as outlined:

- On page 19, the second paragraph reads, "Madison County also has relatively high population and population growth, *and relatively high VMT*."
- On page 22, the last paragraph under commuting information reads, "Based on the analysis of this factor, *there are no counties with commuting data showing a potential to contribute* to the PM2.5 violations in Fayette County."
- On page 23, under vehicle miles traveled, it reads, "Based on the analysis of for this factor, no other Kentucky counties, *with the exception of Madison County, have VMT and commuting data with a potential to contribute to PM2.5 violations* in Fayette County."

Kentucky agrees with the EPA statement that while Madison County has the largest number of workers commuting into Fayette County (6,870 commuters), the commuting data do not indicate significant (or any) contributions to Fayette County (page 22 and 23 of EPA's June 29th letter).

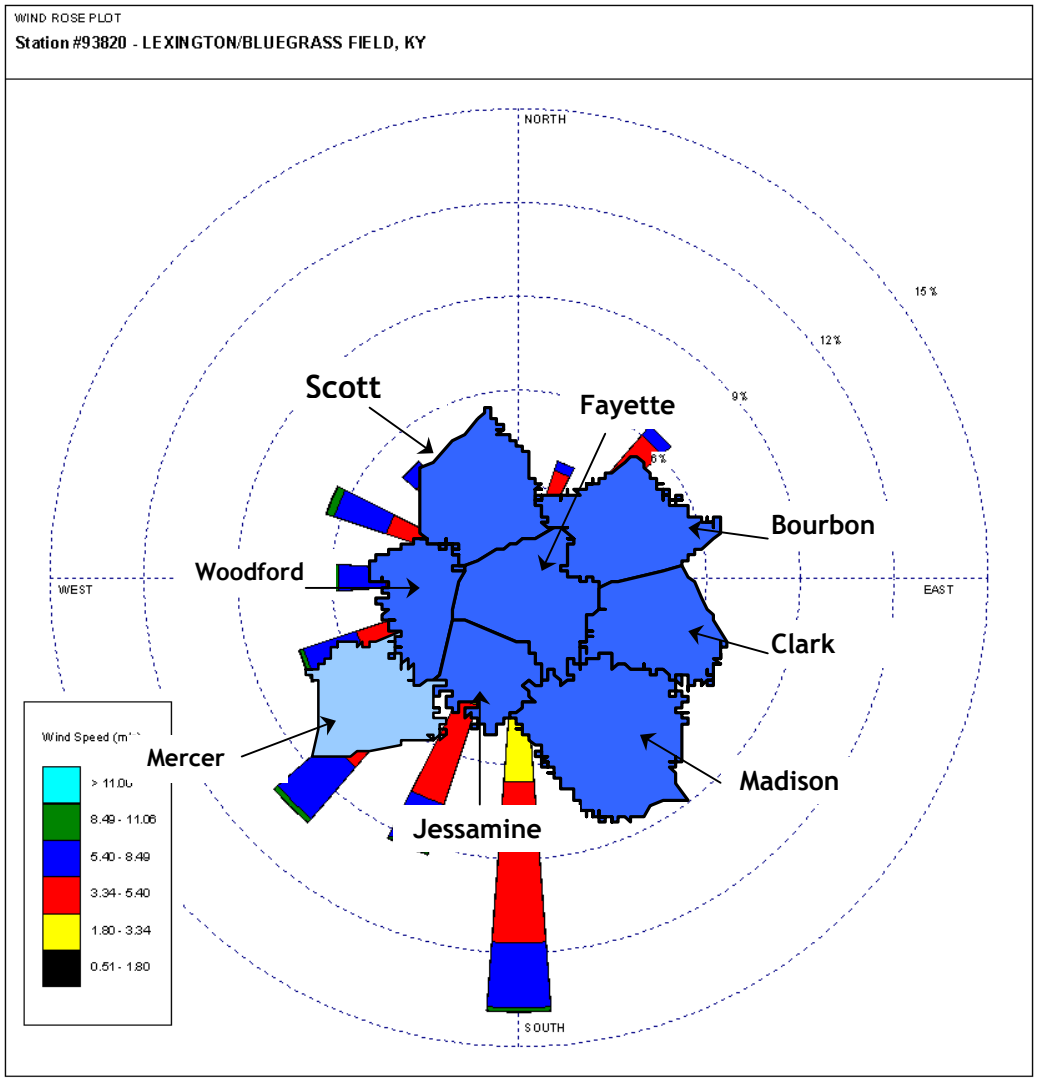
Therefore Kentucky believes that Madison County does not have the population, commuter, or VMT potential to contribute to $PM_{2.5}$ violations in the area.

Meteorology

EPA's response to Kentucky stated that the wind speed/wind direction data provided by Kentucky in the February submittal did not play a significant role in the decision making process and that the information was for summertime winds. Kentucky offers the following information.

Kentucky has provided updated wind rose diagrams. These were created using year-round data from EPA's Support Center for Regulatory Models (SCRAM) website. As shown in the updated wind rose in Figure 11 below, the majority of the time the wind in the Lexington area comes from the south and the southwest. Madison County is southeast from the violating monitor in Fayette County. The wind rose data indicates that Madison County does not impact this monitor.

Figure 8


WIND ROSE PLOT
Station #93820 - LEXINGTON/BLUEGRASS FIELD, KY
NORTH
EAST
SOUTH
WEST
15 %
12 %
9 %
6 %
Scott
Fayette
Bourbon
Woodford
Clark
Mercer
Madison
Jessamine
Wind Speed (m
> 11.06
8.49 - 11.06
5.40 - 8.49
3.34 - 5.40
1.80 - 3.34
0.51 - 1.80

Additional Regional/National Controls

The implementation of new federal rules to decrease the amount of sulfur in both gasoline and diesel fuel will significantly decrease the amount of SO_2 in the entire area. Because of the Low Sulfur Diesel Rule, in 2007, new clean engines operating on 15-ppm sulfur diesel fuel will reduce NOx emissions by 50%, and reduce PM emissions by more than 90%. Due to the Tier 2 Vehicle and Gasoline Sulfur program, by 2006 average national gasoline sulfur levels will be 90% lower.

Upon implementation of the Clean Air Interstate Rule (CAIR) SO_2 emissions from power plants will be reduced nationwide by 3.6 million tons in 2010 (approximately 40 percent below current levels) and by another 2 million tons per year when the rules are fully implemented (approximately 70 percent below current levels). NO_x emissions would be cut by 1.5 million tons nationwide in 2010 and 1.8 million tons annually in 2015 (about 65 percent below today's levels).

The first phase of compliance under the CAIR rule to reduce both SO_2 and NO_x emissions would be required by 2010, allowing substantial emission reductions in the area, by the proposed attainment date for $PM_{2.5}$ nonattainment areas.

Conclusions

Based on the factors discussed above, Kentucky believes that Madison County should be designated attainment for the $PM_{2.5}$ standard.

- Kentucky believes that EPA's use of the weighted emissions scoring approach was skewed. EPA did not include adjacent county emissions in the total emissions being analyzed for the area. If the emissions from the entire area under review were used, vs just those within the MSA, a very different result in the weighted emissions scores would have occurred. Madison County would not have the potential to contribute significantly to $PM_{2.5}$ levels within the region.

- The monitor in Madison County is showing attainment of the standard. The only monitor showing a violation throughout the entire eight county region is being impacted by extreme urban core activities in a specific geographic location within Fayette County.

- $PM_{2.5}$ levels continue to decline throughout the entire region. From a review of all monitors in the region, an average decline of 13% in $PM_{2.5}$ levels has occurred from 2000 through 2003. Every monitor in the region is currently showing values well within attainment of the annual $PM_{2.5}$ standard using 2002 through 2004 data.

- Additional emission reductions on a national and regional level will provide substantial additional emission reductions in the region. The anticipated sulfur reductions due to the Low Sulfur Diesel Rule, the Tier 2 Vehicle and Gasoline Low Sulfur programs, and the Clean Air Interstate Rule (CAIR) will further lower pollutant levels within this region.

To have this county designated nonattainment would invoke substantial and unnecessary requirements on local government planning agencies. Drastic emission reductions are scheduled to occur in the mobile sector throughout the next several years that will greatly impact pollutant levels in the area. In addition, reductions anticipated by the CAIR provisions, the air monitoring data demonstrating attainment of the $PM_{2.5}$ Standard at two of the three monitors in the area, the downward trend in monitored values, and Kentucky's position that the monitored violation of the standard in the downtown area is the result of a localized "urban core phenomenon," lead to the conclusion that Madison County, Kentucky, should be designated attainment for the $PM_{2.5}$ Standard.